Use of E-Learning in Texas State Agencies and Universities

A Report of the Status of Internet Training for State-Mandated Training Programs in Fiscal 2001

Department of Information Resources

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Executive Summary

Purposes and Scope of Report

This report examines how Texas state agencies and universities utilized Internet technology and other e-learning strategies in the delivery of state-mandated training during fiscal 2001. Its findings are based on a targeted survey of all agencies and universities as well as relevant industry research.

E-learning can be defined as instructional content or learning experiences delivered or enabled by electronic technologies.[1] (The term *e-learning* is used in this paper to refer to "Internet training" and related technologies.) Many successful implementations employ a blended approach that combine one or more technologies, or combine e-learning with traditional classroom instruction.

Use of E-Learning in Texas Agencies and Universities

State-Mandated HR Training

Texas Labor Code § 21.010 requires all agencies and universities to provide two categories of human resources (HR) training to employees: a new employee orientation and a refresher course every two years.[2]

Of the 135 organizations that responded to the survey, 59 reported that they used a method other than traditional classroom training to satisfy some of the state-mandated HR training requirements. Within these 59, 22 used some type of Internet delivery—primarily the use of self-paced, online courses. The remainder of non-classroom training was delivered by other alternatives such as use of videotape, audiotape, and self-paced print material. In all cases, classroom training leads by a wide margin, with e-learning solutions representing the lowest usage. Table 1 summarizes findings in this area.

Table 1—State-Mandated HR Training in Fiscal 2001 by Delivery Method

Delivery Method	People Completing Courses*		Courses Delivered	
	Number	Percent	Number	Percent
Traditional classroom	85,641	81%	200	67%
Internet solutions	3,961	4%	28	9%
Other (videotape, audio, print, etc.)	15,953	15%	72	24%
Total	105,555	100%	300	100%

* The same employee may take multiple courses, so the *Number of People Completing Courses* does not represent distinct employees, but seats filled in the classes.

Delivery of Other State-Mandated Training

Some agencies and universities are required to deliver other training to their employees as well. Such training usually covers topics in health, safety, and consumers' rights. Thirty-six organizations submitted responses in this category.

As with the HR training, the training was delivered primarily by traditional classroom methods, as can be seen in Table 2.

Table 2—Other State-Mandated Training in Fiscal 2001 by Delivery Method

Delivery Method	People Completing Courses*		Courses Delivered	
	Number	Percent	Number	Percent
Traditional classroom	123,068	92%	138	81%
Internet solutions	4,015	3%	9	5%
Other (videotape, audio, print, etc.)	7,352	5%	24	14%
Total	105,555	100%	300	100%

* The same employee may take multiple courses, so the *Number of People Completing Courses* does not represent distinct employees, but seats filled in the classes.

Other Distance Learning Initiatives

Since the goal of the originating legislation[3] was "[t]o reduce costs, maximize efficiency, and minimize travel costs and other budget expense," responding organizations requested the opportunity to share optional information about additional programs that meet that goal. Twenty-six organizations provided 133 examples of how their organizations are using various distance learning solutions. This area provides some representative anecdotes, including the following:

- Collaboration among agencies by using an e-mail discussion list, a user group focusing on multimedia development, and state master contracts for the use of vendor online training
- The use of alternatives to traditional classroom training including videoconferencing, Web conferencing, and even "teletraining," which requires only a telephone.

Considerations for Use of E-Learning in Texas Government

The State Agency Coordinating Committee (SACC) Training & Development Subcommittee provided valuable research for this report. A large excerpt from this research is included as an appendix. For e-learning, or Internet training, to be successful in Texas agencies and universities, the key factors are accessibility and appropriateness:

- Accessibility—this includes necessary tools such as computers, software, Internet access, sufficient bandwidth, technical support, and computer literacy issues.
- Appropriateness—agencies and universities need to review many factors (travel needs, number of staff to be trained, learner skills, cultural perceptions, learning environment, potential costs, etc.) to choose the applications most suited for successful e-learning.

Introduction

Texas government is geographically immense and enormously complex. More than 200 separate agencies and universities represent more than 280,000 employees. All across Texas and under widely varying conditions, state employees provide services in as many different industries as today's conglomerates. Texas employees are checking air, water, and wildlife in the back woods of east Texas. They are patrolling the highways of west Texas and constructing the bridges and highways of tomorrow. These men and women guard the corridors and towers of our prisons, provide physical and mental healthcare to our citizens, maintain sophisticated technological infrastructures, and educate our future leaders.[4]

The smallest state agencies have a handful of people while the largest agencies and universities employ tens of thousands. Resources vary dramatically from one organization to the next, with each having independent responsibility for its support functions, including employee training. Finding the most appropriate, effective methods of equipping employees with the skills and knowledge that they need to effectively do their jobs is an ongoing challenge that agencies and universities are constantly exploring.

The 77th Legislature directed the Department of Information Resources (DIR) to prepare a report on the use of the Internet to deliver training within Texas agencies and universities. This report examines the methods by which state-mandated training programs were being delivered to state employees in fiscal 2001 and on the use of e-learning technologies within the agencies and universities during that time.

Legislation Mandating the Report

The mandate is found in the 77th Legislature General Appropriations Act, Article IX, Section 9.14, as follows:

> **Training Programs Using the Internet.** To reduce costs, maximize efficiency, and minimize travel costs and other budget expense, it is the intent of the Legislature that state agencies and institutions of higher education use Internet-based training for state-mandated human resources training and other training programs if Internet-based training is available and appropriate. Not later than January 1, 2002, the Department of Information Resources shall report to the Legislature regarding the amount of training conducted by state agencies and institutions of higher education and on the use of Internet-based training by the agencies and institutions. The agencies and institutions shall timely provide the Department of Information Resources with information necessary to make the report.

Background on State Government

Number of Agencies, Locations, Employees

Texas has more than 200 state agencies, commissions, universities, and boards, as well as a dozen pseudo-agencies and state chartered institutions. These organizations employed more than 280,000 people in fiscal 2001. The largest agencies, such as the Texas Department of Transportation and the Texas Department of Health, have numerous regional or district offices. Even medium-sized agencies, such as the Texas Animal Health Commission, may have several offices around the state.

The state is equivalent to the most complex private sector conglomerate. The complexity is amplified in employee training because the legislature mandates that government organizations must provide their employees specific training—human resources training—that is not required of private organizations.

Collaborative Efforts within State Government Training Initiatives

With few exceptions, each agency or university is independently responsible for providing its employees with necessary training. While there are some informal efforts at sharing resources, there is no statewide human resources office or training center.

A few training programs have been centralized for the use of all agencies and universities:

- The Governor's Center for Management Development provides an ongoing schedule of management and leadership courses. This program is run on a cost-recovery basis.
- The Office of the State Auditor offers a schedule of fee-based training classes directed at internal auditors. The range of course topics has been expanded to other related areas.
- The Department of Information Resources provides free, half-day technology briefings and conferences for Information Resources Managers and staff.
- The Texas Building and Procurement Commission administers a program of certification training for agency purchasers.

In addition, there are some notable areas of voluntary collaboration:

- The SACC Training & Development Subcommittee focuses on sharing training resources and information among state agencies and universities with the purpose of creating high-quality, cost-effective training for state employees. Agencies and universities are encouraged to designate representatives to attend monthly meetings for the primary purpose of networking and the voluntary sharing of resources.
- The Health and Human Services Commission actively examines ways for its member organizations to identify and share common resources.

- The Department of Information Resources hosts an e-mail discussion list for government employees to post messages about training. The list has approximately 340 members who use the resource to share training information such as requesting referrals, asking for assistance, borrowing classrooms, and notifying each other of training opportunities.
- The Governor's Center for Management Development and the SACC Training & Development subcommittee jointly host a free annual interagency Training Expo. This popular grass-roots effort is organized completely with volunteers and brings together more than 400 state training staff to share information in a value-packed day.
- The Office of the State Auditor hosts a training and development Web site where information on state agency training classes and facilities can be posted.
- Some of the smallest agencies rely on the training departments of larger agencies to provide state-mandated HR training. For instance, the Texas Health Care Information Council obtains its state-mandated HR training from the Texas Department of Health.

State-Mandated HR Training

Texas Labor Code § 21.010 requires all agencies and universities to provide the following training to its employees:[5]

1. NEO Training—New employee orientation training within the first 30 days of employment that includes training on employment discrimination, including sexual harassment.
2. TCHR Refresher Training—Supplemental training on discrimination for all employees every two years.

Other State-Mandated Training

Texas agencies and universities also have other state-mandated employee training. Specific training may be required due to internal policy, funding restrictions, industry best practices, professional certification needs, federal law, and/or state statute. Many organizations also have requirements to deliver training to *external* stakeholders in areas such as regulator training, professional continuing education, or public awareness.

This report explores only that training required by Texas statute to be delivered to state employees. For example, the 75th Legislature mandated by statute that specific state agency purchasing personnel be trained and certified, and directed the Texas Building and Procurement Commission to develop the training and manage this program. Aside from the state-mandated HR training mentioned above, this is the type of "other state-mandated training" covered in the survey and this report.

Overview of E-Learning

Terms used in the field of training and education may have different meanings to people. "Internet training" has an ambiguous meaning in this industry. The more common business definition of "e-learning" is used in this report.

META Group, a research and consulting firm specializing in management of information technology (IT), estimates that by 2005 e-learning will account for 30% to 40% of employee training among global 2000 corporations. They also note "more than 80% of companies implement e-learning for expense reduction, to be derived primarily from avoidance of travel. Eventually, e-learning should be considered as more than a simple cost-control measure, and be viewed as a tool for achieving workforce objectives, which in turn must connect to business performance measures…"[6]

Many businesses and industries are embracing the notion of using e-learning to deliver training to employees.[7] Further, with the changing workforce edging maximum optimization of resources with heavy workloads, e-learning has the potential to provide just-in-time training, equipping the workforce with the skills necessary to accomplish and succeed in their vocation.

A current training trend is establishing a linkage between e-learning and career or professional goals. The following table illustrates some of the major changes in organizations as they adopt e-learning.

Table 3—Major Changes from Classroom to E-Learning

Old Paradigm	E-Learning
Discrete activity	Continuous—from "meta-tagged" bits to degrees online
Off-site, classroom-based, "just-in-case" learning	Extended, global-enterprise, "just-in-time" learning
Cost center	Revenue driver
No alignment to business objectives or outcomes	Aligned to business objectives and outcomes
Competency gaps unknown – minimal assessment	Competency measurement provides ongoing assessment
"One size fits all"	Personalized, targeted learning
Back office training department	Rise of the Chief Learning Officer

Source: Thomas Weisel Partners

According to the American Society of Training and Development (ASTD), e-learning covers a wide set of applications and processes, as well as a variety of delivery methods, as shown in Table 4.[8]

Table 4—Types of E-Learning

Applications and Processes	Delivery Methods
▪ Web-based learning (using off-the-shelf or customized solutions) ▪ Computer-based learning ▪ Virtual classrooms ▪ Digital collaboration	▪ Internet, intranet/extranet ▪ Audio and videotape ▪ Satellite broadcast ▪ Interactive TV ▪ CD-ROM

E-learning offers almost limitless possibilities. It can be instructor-led or self-paced. It can be delivered one-on-one or to an unlimited audience. Learning can be offered real-time or anytime.

However, with the endless possibilities also come countless decisions that must be made about the technology, the approach, the degree of customization, implementation strategies, costs/benefits, and many other issues. Each organization needs to examine the associated costs, benefits, and risks to determine which type of solution is appropriate.

Survey Results: Status of E-Learning in Texas Government

Survey Background

The primary sources of information in this report include

1. A targeted survey conducted by DIR to collect specific information about the use of e-learning, or Internet training, in state government during fiscal 2001.
2. Relevant industry research.
3. Information provided the SACC Training & Development Subcommittee and its members who direct training efforts with state organizations.

Internet Training Survey of State Agencies and Universities

In November 2001, DIR conducted an online survey of all state agencies and universities. Organizations were asked to report the amounts and delivery methods for providing the state-mandated training in employment discrimination training (two areas), as well as any other employee training they were required by state statute to provide.

Survey Background and Assumptions

- The reporting period for responses to the survey was fiscal 2001.
- The survey information was limited to data related to state employee training.
- Public education and informational activities were not included.
- The scope of the survey was limited to include *state-mandated HR training* and *other state-mandated training.*
- The organization responsible for providing the specific training was obligated to report the training, regardless of whether the training was delivered internally or outsourced, even to another agency.

The Survey Instrument

The survey collected information about four areas:

1. Organization training profile and view of e-learning
2. State-mandated human resources training
3. Other state-mandated training
4. Other distance learning initiatives

Not all agencies had data to report in every category. Some data was inconsistently reported and had to be discarded for analysis. In a few instances, some agencies reported a course under more than one delivery method because the course was offered through different media. Thus, there is no precise correspondence between the number of agencies and the number of courses reported as "required."

Section 1: Organizational Training Profile and View of E-Learning

Description of Survey Information

This section of the survey captured the organization's size, geographic distribution of employees, the type of training departments within the organization, and information on the organization's use of distance learning technologies.

For the purpose of this report, organizations were considered by size, as shown in Table 5.

Table 5—Organization Size

Number of Employees	Organization Size Category
Fewer than 100 employees	Small
100 to 500 employees	Medium
More than 500 employees	Large

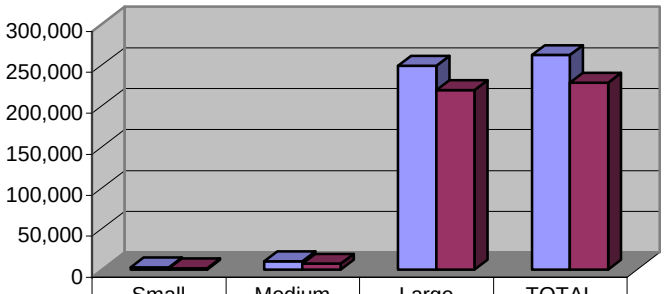
Organizations are also grouped by type as an agency or university. Data from this section is used to analyze correlations between agency type or size and various elements of distance learning collected by other sections of the survey.

Survey Population and Response Rates

The survey was delivered to most state agencies and universities. Of 204 organizations identified by DIR as possible participants, a total of 135 responded fully to the survey.

Because of the high percentage of responses from large organizations, the data actually represent 85% of all agency and university employees, illustrated in Figure 1.

Figure 1—Respondents by Size of Organization and Number of Employees



	Small	Medium	Large	TOTAL
Total state employees	2,714	10,429	248,970	262,112
Total employees of respondents	1,636	7,353	219,087	228,076

Since the vast majority of state employees are represented by the sample, it is reasonable to assume that valid statistical inferences can be made for the entire population of state employees. This is true even for subclasses such as small agencies.

Response to the survey was inhibited somewhat by the tight deadlines and by the lack of readily accessible data. Several responses were received after the data analysis was underway and were not included.

Agency Uses of and Attitudes Toward Distance Learning

The survey attempted to determine how organizations were using the Internet to supplement training methods and activities. Most organizations seem to be using the tools already available to the organization at no or little additional cost.

The most common applications are administrative duties and research, as can be seen in Table 6. There appears to be little use of real-time interactive tools such as instant messaging between instructor and student. This fits with patterns found elsewhere in the study that indicate online interactive training is still uncommon.

The larger an agency and more complex its training needs, the more often staff seek ways to use technology to support and streamline employee training. Few small agencies have a formal training department, so the use of the Internet to support training activities is naturally less.

Table 6—Use of the Internet in Fiscal 2001 to Support Employee Training by Organization Size

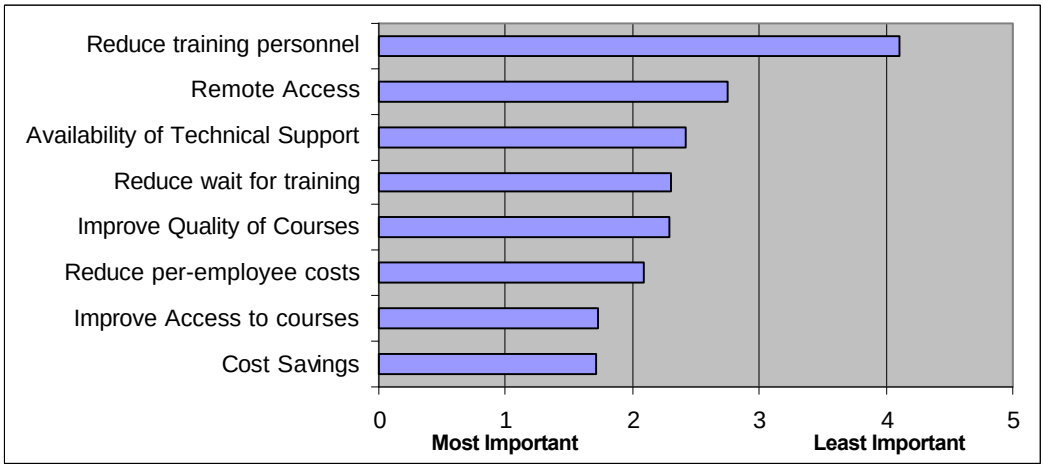
Methods	Small	Medium	Large
E-mail notification of training opportunities	82%	89%	96%
E-mail distribution of class materials (handouts, reference material, contact lists)	20%	54%	63%
E-mail between instructor-and-student and student-and-student for discussion and questions	4%	46%	61%
E-mail for administrative activities such as class confirmations and reminders	51%	89%	93%
Online assessment tools (pre/post tests, aptitude tests, other skill/knowledge assessments)	10%	46%	46%
Internet research by instructors/course designers in development of courses	16%	50%	83%
Internet research as part of class assignments and exercises	8%	29%	54%
Internet-based chat or discussion	10%	11%	20%
Employee participation in free industry and vendor briefings delivered via the Internet	35%	54%	56%
Posting of handouts, presentations, class/conference materials on Web site	27%	54%	69%

The survey explored reasons why organizations may not be using the Internet to deliver training. Respondents were asked to rank a list of barriers on a scale from one to five, one being the greatest barrier and five being the least. Respondents

appear to believe that the greatest barrier is that e-learning courses may not be equivalent to classroom courses. The least significant barrier appears to be management support, indicating that upper management seems to favor the use of technology to deliver training more efficiently. However, there is not a great difference in rank among all the barriers.

The survey also attempted to determine what organizations consider to be the main benefits of distance learning. Respondents were asked to rate a list of benefits on a scale from one to five, one being the greatest and five being the least benefit. The results, charted in Figure 2, show that the greatest benefit is seen as reduction in costs, a strategy also urged by industry analysts. The second-place benefit is seen as improving access to courses. This is also a cost issue because travel costs reduce the amount of training that can be delivered to employees. The least important benefit, by a wide margin, is a reduction in training personnel.

Figure 2—Perceived Benefits of E-Learning



Section 2: State-Mandated Human Resources Training

The only training mandated to all employees, regardless of agency or position, was the *employment discrimination training for state employees,* as identified in Texas Labor Code § 21.010. This section of the survey collected information on how that specific training was delivered, referring only to the two courses all state employees must take, which are commonly referenced as:

1. **NEO Training**—New employee orientation training, given within the first 30 days of employment, including training on "employment discrimination involving sexual harassment."
2. **TCHR Refresher Training—**Supplemental training on discrimination required for all employees every two years.

For each course, the information collected included the number of employees receiving the training, how often the training was delivered, delivery methods, and associated costs (optional). Every agency and university was required to report on courses covered in this section.

Of the 135 organizations that responded to the survey, 59 reported that they used a method other than traditional classroom training to satisfy some of the state-mandated HR training requirements. Within these 59, 22 used some type of Internet delivery—primarily the use of self-paced, online courses. The remainder of non-classroom training was delivered by other means, such as use of videotape, audiotape, and self-paced print material. In all cases, classroom training leads by a wide margin, with e-learning solutions representing the lowest usage. Table 7 summarizes findings in this area.

Table 7—State-Mandated HR Training in Fiscal 2001 by Delivery Method

Delivery Method	People Completing Courses*		Courses Delivered	
	Number	Percent	Number	Percent
Traditional classroom	85,641	81%	200	67%
Internet solutions	3,961	4%	28	9%
Other (videotape, audio, print, etc.)	15,953	15%	72	24%
Total	105,555	100%	300	100%

* The same employee may take multiple courses, so the *Number of People Completing Courses* does not represent distinct employees, but seats filled in the classes.

1. NEO Training

Organizations reported that the majority of Internet-based NEO Training classes were delivered by self-paced CBT-type modules for all organization sizes, as can be seen by Figure 3.

Table 8 shows the number of classes and the preferred delivery method. One interesting finding is that smaller agencies present a greater portion of NEO Training via other delivery methods. These methods include videotape, audiotape, and self-paced print material. In addition, the larger agencies and universities present a greater portion of NEO Training using the Internet.

Figure 3—Percent of Employees Completing NEO Training in Fiscal 2001 by Delivery Method

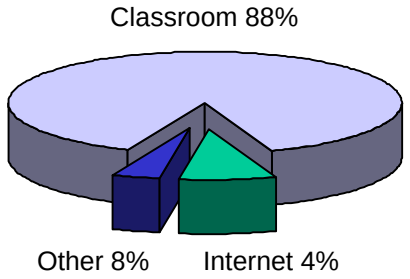


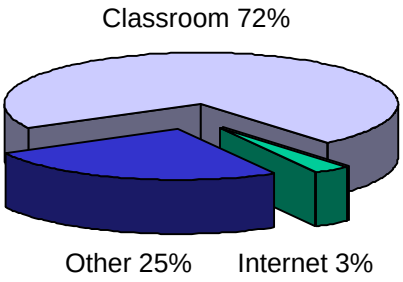
Table 8—Comparison of NEO Training in Fiscal 2001 by Delivery Method

Delivery Method	People Completing Courses*		Courses Delivered	
	Number	Percent	Number	Percent
Traditional classroom	52,514	88%	105	68%
Internet solutions	2,503	4%	13	8%
Other (videotape, audio, print, etc.)	4,606	8%	37	24%
Total	59,623	100%	155	100%

2. TCHR Refresher Training

Figure 4 depicts the delivery methods used of all organizations. As with NEO Training, the most common delivery method is live classroom instruction. "Other" represents an even more substantial portion of delivery methods than in NEO Training. This is primarily due to many agencies using the videotaped refresher training provided by TCHR rather than producing their own course. Internet-based training is also reported more frequently for this training, as can be seen in Table 9.

Figure 4—Percent of Employees Completing TCHR Training in Fiscal 2001 by Delivery Method



As with NEO Training, organizations reported that the method of Internet delivery was self-paced CBT-type module. Methods of "other" training include videotape, audiotape, and self-paced print material.

Table 9—TCHR Refresher Courses in Fiscal 2001 by Delivery Method

Delivery Method	People Completing Courses*		Courses Delivered	
	Number	Percent	Number	Percent
Traditional classroom	33,127	72%	95	69%
Internet solutions	1,458	3%	15	6%
Other (videotape, audio, print, etc.)	11,347	25%	35	25%
Total	45,932	100%	155	100%

Section 3: Other State-Mandated Training

This section of the survey collected data on state-mandated training *other* than the HR training required by Texas Labor Code § 21.010. Each organization was asked to examine its governing legislation and determine what courses should be reported. For many organizations, there were no mandates to deliver training other than that required by Texas Labor Code § 21.010.

Agencies deliver about 60% of other state-mandated courses, with universities delivering the remaining 40%. However, agencies train nearly 87% of all employees who take other state-mandated courses.

Other state-mandated training is predominantly delivered in a traditional classroom setting for all organizations, regardless of size (Table 10). Agencies, as a whole, use live classroom delivery methods to a much greater extent than universities. On the other hand, universities are slightly more likely to use the Internet for course delivery. This is no doubt because universities were early adopters of the Internet and distance learning technologies and are often better equipped with infrastructure required for e-learning.

More than half of the classes documented in the survey were also identified as recurring. This may indicate that savings are possible by shifting from classroom instruction to other methods where appropriate.

Table 10—Other State-Mandated Courses in Fiscal 2001 by Delivery Method

Delivery Method	People Completing Courses*		Courses Delivered	
	Number	Percent	Number	Percent
Traditional classroom	123,068	92%	138	81%
Internet solutions	4,015	3%	9	9%
Other (videotape, audio, print, etc.)	7,352	5%	24	24%
Total	134,439	100%	171	100%

The majority of classes, and by far the largest number of learners, are in the Health and Safety category (Table 11). Most of these courses are delivered by the Department of Mental Health and Mental Retardation. The Department of Criminal Justice and Department of Transportation also have extensive training programs both in Health and Safety and in Organization Technical categories.

Table 11—Courses Delivered and Students Completing Other State-Mandated Training in Fiscal 2001

Training Category	Classroom		Internet		Other Methods	
	No. of Courses	No. of Students	No. of Courses	No. of Students	No. of Courses	No. of Students
Management/supervisory	2	117				
Business/professional skills	14	1,844	1	450		
Health and safety	51	74,187	1	62	9	1,657
Interpersonal skills						
End-user computing	2	7,005				
Information technology	4	212				
Human resources	39	12,569	1	0	9	2,585
Organization technical	19	24,095	1	788	3	1,162
Other types of training	8	4,505	5	2,715	4	2,466
Total	139	124,534	9	4,015	25	7,870

Section 4: Other Distance Learning Initiatives

Definition and Background for Collecting Information

Twenty-six organizations provided 133 examples of how their organizations use distance learning. Providing information for this section of the survey was *completely optional,* so it is important to bear in mind that any reporting under this section was self-selected by individual organizations. The information provided is primarily anecdotal.

Distance learning can be any structured learning activity in which the instructor and the students are separated by geographic distance. In e-learning, technology—*usually computer-related*—is used to bridge the gap between the members of the class. Distance learning includes all e-learning technologies *and* any other mechanism, such as the use of audiotapes and print material (e.g., paper correspondence courses).

This report targets *state-mandated training,* which is only a small portion of all employee training. Since the goal of the originating legislation was "[t]o reduce costs, maximize efficiency, and minimize travel costs and other budget expense," responding organizations requested the opportunity to share optional information about additional programs that meet that goal.

Examples of Distance Learning Initiatives

- The Texas Department of Health (TDH) is actively examining all types of distance learning for its employees, including the internal development of online courses. To increase collaboration across divisions, and ultimately across agencies, TDH formed the Austin Area Macromedia Users Group. Through this parent organization and several special interest groups, online learning developers share information, development expertise, course modules, and free training for the developers.
- The Texas Commission for the Blind offers training via "telecourses," which usually involve two to four sessions, each lasting two hours or less. Reading assignments are sent to participants before class via mail or e-mail, and assignments are given between sessions. Many of these courses are pre-approved for Certified Rehabilitation Counselor continuing education credit.
- The Texas Department of Transportation is undergoing a strategic implementation of comprehensive training alternatives combining classroom training, the installation of a videoconferencing network, in-house development of online courses, and use of off-the-shelf technology-based courseware.
- The Department of Information Resources has negotiated master contracts with three vendors of self-paced, online courses. For a low (per person) annual fee, organizations subscribe to a large library of self-paced, online courses on a wide variety of topics. Services like these, available from a centralized source, can easily be implemented by any organization regardless of how small. Of the 26 organizations that provided information for this section, 20 subscribe to training libraries like these.
- The Employees Retirement System implemented a Web conferencing solution to present information about employee benefits to clients throughout the state. The Web conference tool is easily used by any client with Internet access and a phone, and allows customized, real-time training without the need for travel.
- The Texas Workforce Commission developed a self-paced, online version of its new employee orientation class and has endeavored to share this information, including the source code, with other agencies.

- The University of Texas System Administration has instituted a comprehensive “compliance program” to ensure adherence with the various state and federal laws and regulations that apply to institutions of higher education. Within this program is a large training component. All employees are required to receive training on 16 general compliance topics, such as ethics, use of state property, non-discrimination, etc. A library of highly targeted online courses has been developed using a system that automatically tracks which personnel need specific kinds of training, when they need it, and the status of completion. Often these modules are very short (15 minutes), covering a single topic, and allowing the employees to quickly learn the material without ever leaving their desks.

Conclusions

Key Factors

When examining the conclusions of this report, it is critical to remember two key points:

1. The scope of this report deals with only a small subset of all Texas government employee training:
   - State-mandated human resources training
   - Other state-mandated training

   In addition, this report addresses existing attitudes towards e-learning and provides some anecdotal examples of other distance learning initiatives.
2. The data collected is for fiscal 2001. Thus the data and conclusions precede the legislative directive for state agencies and universities to implement Internet-based training for these areas when "available and appropriate." Many organizations are currently exploring alternatives to comply with this mandate.

Survey Findings

Of the 135 organizations that responded to the survey, 22 used some type of Internet delivery for their NEO Training. For the most part these were self-paced, online courses. However, the number of personnel trained outside the classroom was not large. Internet solutions serve the fewest learners of all delivery methods. TCHR Refresher Training exhibited the same characteristics.

Other state-mandated training follows the same patterns. Agencies, rather than universities, deliver most of the training, accounting for almost 87% of all employees who take such training. The bulk of this training is in health, safety, and consumer rights.

Most organizations seem to be doing a good job of using Internet tools to supplement employee training. These tools are already available to the organization at little or no additional cost. The supplemental activities are primarily administrative activities such as using e-mail to announce and confirm training, and distribution of class materials over e-mail or the Web. To a lesser extent these activities also include use of online assessment tools and participation in free industry or vendor online training.

The State of the State

While pockets of initiative and excellence exist within organizations, limited efforts can be seen at the enterprise level. For true success in this area, organizations must experience a cultural shift where employee training is viewed

strategically in terms of a long-term investment tightly aligned with business needs and mission rather than as an expense to be reduced during tight budgets.

- Based on the training surveyed for this report, agencies are just beginning to utilize e-learning in the areas surveyed.
- Employee education must become an executive management priority with support across the organization, involving IT as a strategic business partner.
- Return-on-investment and long-term cost reduction should be drivers of e-learning when considered in a practical manner. E-learning solutions may offer the ability to provide more training for lower direct costs. However, there may be significant start-up costs and intangible costs that must also be considered.
- One of the most significant barriers is resistance to change. Change management at the executive level, at the employee level, and even among the training staff is a critical issue that must be addressed from the onset of any e-learning implementation plan.
- More shared resources, availability of centralized services, and technical support are needed to effectively adopt e-learning.
- While the most commonly referenced type of e-learning is the self-paced, online course, organizations also need to investigate technologies, such as Web conferencing tools, to expand the types of training delivered remotely and to enhance other collaborative efforts.
- E-learning solutions are a viable area of growth for Texas agencies and universities. There are many benefits to be gained. However, these solutions should never be expected to entirely replace classroom training. Rather, organizations should seek a blended approach, taking advantage of what technology has to offer and using it where appropriate. Many experts recommend a maximum goal of 50% of employee training delivered via online methods and the remainder being classroom-based. The goal is to develop a well-balanced portfolio of employee training to maximize all learning across the organization.

Industry Recommendations

The META Group is a research and consulting firm specializing in applications of and management of information technology. Their findings are similar to opinions of most experts in the field.

The META Group estimates that the employee training market was $63 billion in 2001.[9] Further, they estimate that by 2005, e-learning will account for 30% to 40% of employee training among global 2000 corporations. They also note that "more than 80% of companies implement e-learning for expense reduction, to be derived primarily from avoidance of travel. Eventually, e-learning should be considered as more than a simple cost-control measure, and be viewed as a tool for achieving workforce objectives, which in turn must connect to business performance measures in an HR value chain."[10]

META issues cautions about the relative immaturity and complexities of the e-learning marketplace,

> E-learning solutions fall into multiple interlocking categories, and many vendors offer solutions in more than one category. In addition, the pace of structural change in this marketplace (e.g., mergers and acquisitions) means that the vendor landscape changes from month to month. Technology barriers are high, as full compliance with proposed content standards is spotty and vendors have to date focused more on building feature/functionality than on integration among components (even when the components are owned by the same vendor).

After expressing the foregoing cautions, META makes the following recommendations,

> Organizations considering e-learning initiatives should take the following steps…:
> - Use cost reduction as the immediate springboard to e-learning adoption.
> - Embrace microtraining, providing bite-sized chunks of knowledge that are relevant to the challenge faced by the learner, easily absorbed, and reinforced through quick application.
> - Allow multiple e-learning initiatives to operate independently within consistent IT architecture and vendor management standards.
> - Assess employees before and after completing e-learning and maintain competency metrics that connect e-learning to strategic objectives.
> - Do not expect e-learning to replace all employee training.[11]

Cost Considerations in E-Learning

Cost savings as a potential benefit must be examined on a case-by-case basis. It cannot be assumed that e-learning will result in cost savings in every organization, or even in a majority of cases.

However, there is also a substantial cost in *not* training employees sufficiently. Most often not training employees results in poor service to customers and clients. It also reduces employee morale, resulting in increased turnover, and higher staffing costs as new employees must be hired and trained. Such costs are quite difficult to quantify. Some industry experts estimate that hiring and training run 30% to 40% of a new employee's annual salary.[12]

The effect of substandard productivity and poor service are not easy to measure, either, although lawsuits for negligence and incompetence can draw a dramatic, if uneven, caricature of those effects.

Benefits of E-Learning

The potential benefits of e-learning, when compared to classroom instruction, are well-documented. [13]

- Many e-learning solutions provide just-in-time training to an employee and can be available at any hour of the day or night, seven days a week. In

essence, this creates a continual classroom that is not dependent upon time or space.

- E-learning may be less expensive in the long-run, especially when training large numbers of employees; however, start up costs can vary widely and may substantially exceed the cost of traditional classroom training in some cases. Cost savings as a potential benefit should be examined on a case-by-case basis.
- Retention of learned material may be higher since the delivery can be customized to better fit the learner and to appeal to different learning styles.
- Training materials and modules can be updated more easily.
- A consistent message can be delivered.
- Participants may learn faster, so need less time to master a topic. Some experts estimate that material delivered via e-learning solutions can be absorbed up to 50% faster than the same material delivered in a classroom setting.
- Testing and assessment within e-learning has the potential to be better than it is in the traditional classroom. In the classroom setting, the same content is presented to all learners (regardless of background knowledge) and the same test is presented to all learners. This method of testing, while obviously necessary in the classroom environment, pales to the possibilities of offering customized testing to the learner, based on customized content that has been delivered to the learner based on the learner's individual needs.

It is generally not an organization's goal to completely discontinue the use of traditional classroom training, but instead to more selectively plan how training is made available and to choose the appropriate delivery method considering all the relevant factors. This may ultimately include a portfolio of self-paced, online courses; real-time virtual classrooms that reduce the need for travel; traditional classroom instruction; additional technologies such as satellite or audio training, and blended solutions. A common target is to use e-learning strategies to deliver 50% of all employee training.

Appendix A: Definitions

Within the field of training and education, various definitions may exist for the same terms. For the purpose of the initial survey and this report, the following definitions apply:

Asynchronous learning—Learning in which interaction between instructor and learner is intermittent with a delay, or interaction is only with the software, not with an actual person. Examples include self-paced courses taken via the Internet or CD-ROM. (See *Synchronous learning.*)

Class—A course delivered on a particular date, a specific instance of a course.

Computer-based training (CBT)—An umbrella term for the use of computers in both instruction and management of the teaching and learning process. Computer-assisted instruction (CAI) and computer-managed instruction (CMI) are included under the heading of CBT. Some people use the terms CBT and CAI interchangeably.

Delivery—Presentation of material to one or more students as part of a formal educational program. Variants are instructor-led training, Web-based distance learning, online laboratory, CD-ROM, and books.

Delivery costs include, but are not limited to:

- Staff salaries as applied to delivery of course (including trainers, support staff, and others involved).
- Class materials.
- Room or equipment rental fees.
- Other direct costs.

Development—Researching, writing curriculum, developing assessment instruments, developing instructor and/or participant guides, in essence, developing all of the material required to present a course.

Development costs include, but may not limited to:

- Staff salaries as applied to development of the specified course (including development/design staff, support staff, and others).
- Vendor fixed costs (one-time purchases of materials such as CD-ROMs, videotapes, audiotapes).
- Consultant fees or expenses.
- Other direct costs, such as non-variable license fees.

Distance education—Educational situation in which the instructor and students are separated by time, location, or both. Education or training courses are delivered to remote locations via synchronous or asynchronous means of instruction, including written correspondence, text, graphics, audio- and videotape, CD-ROM, online learning, audio- and videoconferencing, interactive

TV, and facsimile. Distance learning does not preclude the use of the traditional classroom. The definition of distance education is broader than and entails the definition of e-learning.

E-learning—Instructional content or learning experiences delivered or enabled by electronic technologies. (The term *e-learning* is used in this paper to refer to "Internet training" and related technologies.) Many successful implementations employ a blended approach that combine one or more technologies, or combine e-learning with traditional classroom instruction.

Instructor-led training (ILT)—Usually refers to traditional classroom training, in which an instructor teaches a class to a room of students. All students and instructors meet at the same time in the same location. The term is used synonymously with on-site training and classroom training.

Internet training—Activities that meet the definition of "training" for this survey and are delivered primarily by TCP/IP network technologies. Although the term "Internet training" is often used synonymously with Web-based training, Internet-based training is not necessarily delivered over the Web, and may not use the HTTP and HTML technologies that make Web-based training possible. The training activities may be either synchronous or asynchronous, and may include externally purchased or internally developed modules. Examples are: self-paced, Web-based courses and events delivered via Web-conferencing, videoconferencing, or Internet broadcast with an interactive component.

Learner hours (total)—Total time all attendees spend participating in a course. May be actual recorded time or derived from calculations based upon average course length. Example: 100 people attend classes of a 4-hour course. Total Learner Time for the course is 400 hours.

Synchronous learning—Learning in which interaction between learner and instructor is real time. Typically, participants communicate directly with each other in person or via technology. Content can also be delivered using Web or videoconferencing, Internet telephony, and two-way live broadcasts of lectures to students in a classroom. (See *Asynchronous learning.*)

Training course—A formal program of learning which follows generally accepted standards of educational programs, and has the following characteristics:

- It is planned in response to an identified educational need.
- The program has identified intended learning objectives.
- Qualified instructional personnel are involved in planning and conducting the activity.
- The content and delivery methods support the intended learning outcomes.
- Participants evaluate the learning activity.
- The activity is interactive, and, ideally, it evaluates learners to assess learning.

Appendix B: Considerations for Use of E-Learning in Texas Government

This appendix contains information from a white paper prepared by the SACC Training & Development Subcommittee in October 2001. The paper contained research and recommendations specifically gathered as consideration during the development of the Internet Training Survey and in the writing of this report.

Role of SACC Training & Development Subcommittee

The State Agency Coordinating Committee is a voluntary association composed of representatives of the 17 largest state agencies plus ex-officio members from the Department of Information Resources, the Governor's Office, and the Legislative Budget Office. SACC's purpose is to examine administrative and management practices, review problems or issues that have an impact across agency lines, and to encourage and foster management practices that are beneficial and cost-effective for all state agencies.

The mission of the Training & Development Subcommittee of SACC is to create training and development opportunities for all state employees, resulting in quality programs that are cost effective for the State of Texas. The subcommittee seeks to realize this mission through collaborative sharing of resources, improving training practices and creating alliances among state agencies, and advocating training and development's role within state government.

The subcommittee assembled a project team to prepare written recommendations and members of the project team provided invaluable assistance in the development the survey and the report.

Benefits and Challenges of E-Learning

While e-learning has many benefits, downsides must be considered before making the significant start-up investment in technology infrastructure that Internet-based training often requires. E-learning is not only a different delivery mechanism, it may also decrease direct human contact and require more motivation and effort on the part of the learner. For example, it is often unrealistic to expect busy workers to carve out their own time for training. Leaders need to schedule training time in the flow of work. In addition, although e-learning may reduce employee time away from work, it does require employees to know the technology involved. While e-learning courses can be constant—the message is standard and consistent—not all employees learn everything that was presented since employees differ in their learning styles.

E-learning can provide real-time, just-in-time training. It often eliminates many of the common logistical problems of coordinating training. It can reduce geographical distance, reduce per-person cost, reduce learning time, and increase access—provided the minimum conditions exist to such training available and successful.

Necessary Conditions

To be used successfully, any e-learning solution must be accessible and available to the learner and an appropriate choice for state government. The following minimum conditions should be present for e-learning to be considered viable:

Accessibility

- Learners who need appropriate access to the necessary computers, software, and tools (such as Internet access)
- Organizations must be able to provide sufficient network bandwidth as needed by the chosen solution
- Learners must possess basic computer navigation capability (ADA) and proficiency

Availability

- Course content must be targeted to employee needs
- Course content must be designed appropriately for the chosen delivery system

Appropriate E-Learning

According to the SACC Training & Development Subcommittee, e-learning will be a likely choice for Texas agencies and universities if more than half of the following conditions exist:

- The course is offered or needed frequently (20 or more times a year)
- There are more than 150 learners
- Learners are geographically distant from each other (5 or more sites)
- Instructors with subject expertise are not readily available in all geographic locations
- Currently, the average learner must travel overnight to attend classroom training
- Learners have widely varying current skill levels
- A standard or consistent message is needed
- Access to training is needed during non-traditional work hours
- There is difficulty in scheduling sufficient training to ensure access
- Learners prefer independent learning and/or are motivated to use e-learning

Note: because there are so many types of e-learning possibilities, this list may not apply for every situation. For example, the decision of when to offer a real-time class using a virtual classroom would be based on different factors than whether or not to build a self-paced online course.

E-learning is a poor choice if it is not available or accessible and it may not be appropriate under the following conditions:

- The course content requires demonstration of motor or sensory skills
- The course content requires human interaction such as modeling, practice, and student demonstration of interpersonal (or similar) skills, or is otherwise not appropriate to online experiences
- The learning environment has frequent interruptions or other distractions

Given that there are certain minimal conditions for this type of training and that not all training is appropriate for e-learning, the readiness of Texas state government to implement such solutions becomes a focus of attention.

Specific issues must be addressed in order to ensure e-learning solutions are available and accessible to state employees. These echo the legislative concerns related to accessibility, availability, and appropriateness.

Infrastructure Considerations

Technological advancements in computer hardware have made it difficult for public service agencies to purchase equipment as often as it is improved. Budget constraints prevent most state agencies from timely upgrades to computers and related equipment once they manage to acquire these major purchases. Computers purchased for state agency service are often equipped without the necessary net cards, sound cards, video cards or memory, which online training usually requires. In addition, Internet access requires even more sophisticated server equipment, telecommunications services (such as Internet service providers), and data lines with expanded bandwidth.

Bandwidth

Depending on its type and design, e-learning solutions can use large chunks of the network bandwidth available to an agency. Some agencies already use the Internet for software applications (such as PeopleSoft) and may currently experience network traffic and bandwidth problems.

Computer Hardware

When identifying the availability of computer hardware for computer-assisted training, consideration should be given to counting and/or classifying computer systems according to the multimedia capacity. Particularly, most computer-delivered training relies on sounds to convey information and/or cue students as to navigation paths. As a standard, computers used for computer-assisted training should have sound cards and speakers. For quality training, full multimedia systems are required.

Wired vs. Wireless Technology

In many state organizations, when available, accessing the Internet is accomplished through landlines—network cabling, network servers, modems, and telephone lines. Yet, the work of the employees of those agencies may not occur

"in the office," requiring employees to travel to sites with computer Internet access. This is acute for those workers performing job duties out of doors in remote locations. Examples include facilities and landscaping upkeep, refuse collection, road repair, correctional security, law enforcement, emergency service work, agricultural extension services, mail delivery, construction, and a multitude of others. This means, of course, that these workers rarely have access to computer equipment with which to engage in e-learning activities. As one alternative, some organizations must set up computer labs for employees who then must travel to these centralized sites.

Accounting Systems

Although the legislature desires to reduce costs associated with training, Texas government accounting systems generally are not adequately designed to track all costs associated with training. As an example, when a state employee incurs education, or training-related travel expenses, the current travel voucher system typically does not have sufficient coding to collect these costs and aggregate them into a report. Since travel cost is seen to be a significant expense related to training and education, the current accounting system presents a barrier in comparing and proving cost-effectiveness of various training strategies.

Disability Issues

According to federal and state law, if the training is to be mandated, e-learning must be accessible to all employees. This means that all applications and hardware used in training must be accessible to employees with visual, auditory, mobility, and other disabilities.

Technical Staff Resources

The development of many e-learning solutions requires staff not only as subject matter experts and curriculum designers, but also with the necessary technical skills to develop, implement, and maintain these technology-based solutions. In some cases, existing staff will require additional training. In others, entirely new skill sets will be needed. Organizations must assess these needs and plan for how they will develop the necessary staff resources internally or contract for them externally. Such decisions may also drive the type of e-learning solution chosen. Currently, there are no centralized resources to assist the agencies and universities to develop e-learning solutions.

Organizational Culture

Access to the Internet

Even when an organization has the technical capacity to connect its computers to the Internet, some agencies seek to reduce misuse by limiting employee access. In some organizations, only certain groups of employees are permitted Internet access.

Computer Skills

A great many state classified job descriptions do not require basic office skills (such as typing), let alone specific computer skills. E-learning solutions generally require at least cursory computer skills for users to take advantage of the training opportunity. Requisite skills in many state positions are people- or environment-oriented rather than technically-oriented. Successful use of e-learning will require development of basic computer navigation skills for those employees who lack such skills.

Organizational Acceptance of E-Learning

Organizations must frequently face cultural barriers in gaining real acceptance of e-learning solutions. Learners may perceive the choice of e-learning as inferior to the option of attending a face-to-face class. The convenience of "at-your-desk learning" is also frequently a barrier. A very real problem is the difficulty, by both managers and learners, of dedicating sufficient uninterrupted time to complete the training activity, especially when it is not a mandatory, compliance-driven topic. Organizations need to be prepared to identify these obstacles and to address them with appropriate strategies if e-learning is to be successful.

Appendix C: Distance Education, an Overview

Internet training and e-learning are concepts tightly tied to the field of distance education. This appendix provides a basic overview of distance education for those readers who may not be familiar with the concepts and terms and is offered as background material for the report. This information is re excerpted from the guide Distance Education at a Glance*, published by Barry Willis at the University of Idaho Engineering Outreach (http://www.uidaho.edu/evo/dist1.html).*

What is Distance Education?

Within a context of rapid technological change and shifting market conditions, the American education system is challenged with providing increased educational opportunities without increased budgets. Many educational institutions are answering this challenge by developing distance education programs. At its most basic level, distance education takes place when a teacher and student(s) are separated by physical distance, and technology (i.e., voice, video, data, and print), often in concert with face-to-face communication, is used to bridge the instructional gap. These types of programs can provide adults with a second chance at a college education, reach those disadvantaged by limited time, distance or physical disability, and update the knowledge base of workers at their places of employment.

Is Distance Education Effective?

Many educators ask if distant students learn as much as students receiving traditional face-to-face instruction. Research comparing distance education to traditional face-to-face instruction indicates that teaching and studying at a distance can be as effective as traditional instruction, when the method and technologies used are appropriate to the instructional tasks, there is student-to-student interaction, and when there is timely teacher-to- student feedback (see Moore & Thompson, 1990; Verduin & Clark, 1991).

How is Distance Education Delivered?

A wide range of technological options are available to the distance educator. They fall into four major categories:

- **Voice**—Instructional audio tools include the interactive technologies of telephone, audioconferencing, and short-wave radio. Passive (i.e., one-way) audio tools include tapes and radio.
- **Video**—Instructional video tools include still images such as slides, pre-produced moving images (e.g., film, videotape), and real-time moving images combined with audioconferencing (one-way or two-way video with two-way audio).

- **Data**—Computers send and receive information electronically. For this reason, the term "data" is used to describe this broad category of instructional tools. Computer applications for distance education are varied and include:
  - Computer-assisted instruction (CAI)—Uses the computer as a self-contained teaching machine to present individual lessons.
  - Computer-managed instruction (CMI)—Uses the computer to organize instruction and track student records and progress. The instruction itself need not be delivered via a computer, although CAI is often combined with CMI.
  - Computer-mediated education (CME)—Describes computer applications that facilitate the delivery of instruction. Examples include electronic mail, fax, real-time computer conferencing, and World-Wide Web applications.
- **Print**—Print is a foundational element of distance education programs and the basis from which all other delivery systems have evolved. Various print formats are available including: textbooks, study guides, workbooks, course syllabi, and case studies.

Which Technology is Best for Distance Learning?

Although technology plays a key role in the delivery of distance education, educators must remain focused on instructional outcomes, not the technology of delivery. The key to effective distance education is focusing on the needs of the learners, the requirements of the content, and the constraints faced by the teacher, before selecting a delivery system. Typically, this systematic approach will result in a mix of media, each serving a specific purpose. For example:

- A strong print component can provide much of the basic instructional content in the form of a course text, as well as readings, the syllabus, and day-to-day schedule.
- Interactive audio or video conferencing can provide real time face-to-face (or voice-to-voice) interaction. This is also an excellent and cost-effective way to incorporate guest speakers and content experts.
- Computer conferencing or electronic mail can be used to send messages, assignment feedback, and other targeted communication to one or more class members. It can also be used to increase interaction among students.
- Pre-recorded videotapes can be used to present class lectures and visually oriented content.
- Fax can be used to distribute assignments, last minute announcements, to receive student assignments, and to provide timely feedback.

Using this integrated approach, the educator's task is to carefully select among the technological options. The goal is to build a mix of instructional media that meets the needs of the learner in a manner that is instructionally effective and economically prudent.

Effective Distance Education

Without exception, effective distance education programs begin with careful planning and a focused understanding of course requirements and student needs. Appropriate technology can only be selected once these elements are understood in detail. There is no mystery to the way effective distance education programs develop. They don't happen spontaneously; they evolve through the hard work and dedicated efforts of many individuals and organizations. In fact, successful distance education programs rely on the consistent and integrated efforts of students, faculty, facilitators, support staff, and administrators.

Appendix D: Survey Instrument

End Notes

1 National Governor's Association Center for Best Practices. *A Vision of E-Learning for America's Workforce.* June 2001. <http://www.nga.org/cda/files/elearningreport.pdf>.

2 TEX. LABOR CODE § 21.010 (1999).

3 General Appropriations Act, 77th Leg., R.S., art. IX, § 9.14 (2001).

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